



Alternative and Renewable Fuel and Vehicle Technology Program

Staff Workshop on Hydrogen Refueling Stations
Minimum Technical Requirements

Charles Imbrecht Hearing Room
December 4, 2017



Agenda

Welcome 10:00 a.m.

Overview and Discussions of GFO-15-605 Minimum
Technical Requirements 10:10 a.m.

- Hydrogen Quality
- Type Evaluation (dispensers)
- Fueling Protocols
- Minimum Daily Fueling Capacity
- Minimum Peak Fueling Capacity

Lunch 12:00 p.m.



Agenda

Overview and Discussions of GFO-15-605 Minimum
Technical Requirements 1:00 p.m.

- Fueling hoses
- Point of Sale (POS) terminal
- Station Operational Status System
- Signage
- Accommodation of hydrogen delivery

Break 2:30 p.m.



Agenda

Ideas for New Minimum Technical
Requirements

3:00 p.m.

Wrap-up

3:30 p.m.

Public Discussion

3:40 p.m.

Adjourn

4:00 p.m.



Welcome

- Facilities and Logistics
- In case of emergency
- Diversity Survey
 - <https://www.surveymonkey.com/r/97HFGFN>



Commitment to Diversity

The Energy Commission adopted a resolution on April 8, 2015, to firmly commit to:

- Increase participation of women, minority, disabled veteran and LGBT business enterprises in program funding opportunities.
- Increase outreach and participation by disadvantaged communities.
- Increase diversity in participation at Energy Commission proceedings.
- Increase diversity in employment and promotional opportunities.



Commitment to Diversity

Fairness – Increase funding accessibility to all Californians.

Inclusion – Small businesses make up a significant portion of the U.S. economy.

Job Creation – Projects can create jobs for residents of the underserved communities.

Diversity of Ideas – Great ideas occur in a variety of areas.

Diversity in Communities' Needs – Needs vary widely from one area to the next (air quality, socioeconomic, etc.).



Workshop Purpose

- To provide a forum to discuss the hydrogen refueling “Minimum Technical Requirements” in GFO-15-605.
- To discuss new ideas for “Minimum Technical Requirements” for future solicitations.



Reminder

- This workshop is discussing possible solicitation concepts.
- No applications are being accepted at this time.



GFO-15-605 Minimum Technical Requirements

Esther Odufuwa, Mark Johnson,
Sebastian Serrato



GFO 15-605 Minimum Technical Requirements

Section VI.	Item
A.	Hydrogen Quality
B.	Type Evaluation for Hydrogen Refueling Station Dispensers
C.	Fueling Protocols
D.	Minimum Daily Fueling Capacity
E.	Minimum Peak Fueling Capacity
F.	Fueling Hoses
G.	Point of Sale (POS) Terminal
H.	Connection to the Station Operational Status System
I.	Signage
J.	Station Design Requirements



Overview of GFO 15-605 Minimum Technical Requirements

- Hydrogen Quality
- Type Evaluation (dispensers)
- Fueling Protocols
- Minimum Daily Fueling Capacity
- Minimum Peak Fueling Capacity



Hydrogen Quality

GFO-15-605

- Conform to CCR Title 4, Division 9, Chapter 6, Article 8, Section 4180 and 4181 which adopts SAE International J2719.
 - Every three months
 - Also, when hydrogen lines are exposed to contamination due to maintenance or other activities
 - Best practices to monitor gas stream humidity for electrolyzers
 - Best practices to monitor CO & CO₂ for SMR



Type Evaluation (dispensers)

GFO-15-605

- Conform to CCR Title 4, Division 9, Chapter 1, Article 1, Section 4002.9, Hydrogen Gas-Measuring Devices (3.39). Retail must also comply with NIST Handbook 130.
- Undergo type evaluation according to California Type Evaluation Program (CTEP).



Type Evaluation (dispensers)

GFO-15-605

- Include a plan for testing dispensers using either California Department of Food and Agriculture, Division of Measurement Standards (CDFA/DMS) or a Registered Service Agent.
- Must receive a Temporary Use Permit or Certificate of Approval from CDFA/DMS to dispense hydrogen for retail sale.



Fueling Protocols

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- Comply with most recent SAE International J2601 and CSA HGV 4.3.
- State how the station will use HyStEP during commissioning, or OEM best practices if HyStEP is unavailable.
- Dispense at mandatory H70-T40.
- Describe optional H35-T20, if applicable.



Minimum Daily Fueling Capacity

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- No less than 180 kg per day.
- Over a 12 hour period, between 6 a.m. and 6 p.m.



Minimum Peak Fueling Capacity

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- H70-T40: minimum of five 4kg fills per hour, back-to-back, between 6 a.m. to 9 a.m. and 3 p.m. to 6 p.m.
- H35-T20 (if opted): minimum of four 4kg fills per hour, back-to-back.
- Describe how HyStEP or FCEVs will be arranged to test peak fueling capacity over a one hour period during peak hours.



Additional Questions?



California Energy Commission

Lunch



GFO-15-605 Minimum Technical Requirements

Esther Odufuwa, Mark Johnson,
Sebastian Serrato, Andrew Martinez,
Phil Cazal, Jean Baronas



Overview of GFO 15-605 Minimum Technical Requirements

- Fueling Hoses
- Point of Sale
- Station Operational Status System
- Signage
- Accommodation of Hydrogen Delivery



Fueling Hoses

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- Fueling hoses: conform to the latest version of SAE International J2600-2012 or ISO 17268-2006.



Point of Sale

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- Point of Sale (POS) terminal compatible with major credit cards (EMV chip), debit cards, and fleet cards.



Station Operational Status System

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- Connect to SOSS (hardware and software).



Signage

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- Post Signage:
 - To educate the public about hydrogen.
 - To acknowledge public funding.
- Initiate planning for trailblazer (signaling local station) and Caltrans signage.



Station Design Requirements

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- Station design requirements
 - Accept hydrogen from a mobile refueler or tube trailer.



Additional Questions?



Break



Ideas for New Minimum Technical Requirements



Annual Evaluation Suggestions

Table 7: Recommendations for Station Fueling Capacity for Various Station Classifications²⁰

Classification	Description	24-hour Throughput	12-hour Throughput	3-hr Peak Total Throughput	Peak Hourly Throughput
Core Market Area, Local Fueling Market Capacity Growth	Multiple local stations established; new capacity has greater priority than coverage	600+	480+	136+	48+
Core Market Area, Local Fueling Market Coverage Growth	Multiple local stations established; redundancy and coverage have greater priority than capacity	300+	240+	68+	24+
Core Market Area, Local Fueling Market Initiation	Among first 3 stations in a local fueling market	300+	240+	68+	24+
Intermittent Connector	Stations intended for long-distance fueling	200+	160+	44+	16+
Intermittent Destination	Stations intended for fueling at vacation locations	200+	160+	44+	16+



Annual Evaluation Suggestions

Table 8: Recommendations for Station Fueling Performance Capabilities for Various Station Classifications (back-to-back fueling specified for 4-kg fills, all fills should be less than 5 minutes)

Classification	Description	Fueling Positions	Simultaneous Fueling	On-Site Redundancy	Back-to-Back Fueling
Core Market Area, Local Fueling Market Capacity Growth	Multiple local stations established; new capacity has greater priority than coverage	2+	Required	Preferred	3 fills with 3-minute rests between, followed by 5-minute rests for 3 peak hours; <10-minute rest otherwise
Core Market Area, Local Fueling Market Coverage Growth	Multiple local stations established; redundancy and coverage have greater priority than capacity	2+	Required	Preferred	3 fills with 3-minute rest between, followed by 5-minute rests for 3 peak hours; <10-minute rest otherwise
Core Market Area, Local Fueling Market Initiation	Among first 3 stations in a local fueling market	2+	Required	Optional	5-minute rests between fills for peak 3 hours; <10-minute rest otherwise
Intermittent Connector	Stations intended for long-distance fueling	1+	Optional	Optional	5 fills with 10-minute rests between in one peak hour; <20-minute rest otherwise
Intermittent Destination	Stations intended for fueling at vacation locations	1+	Optional	Optional	5 fills with 5-minute rests between in one peak weekend hour; followed by 10-minute rests for 3 peak weekend hours; <20-minute rest otherwise



Annual Evaluation Suggestions

- Capacity suggestions based on simple calculator accounting for fueling pattern (time for fill, time for rest), daily gasoline station fueling patterns, and standard assumptions of average fills
- Performance recommendations additionally consider likely station roles in varying geographies, depending on extent of existing station network development
 - Conceptual classifications first proposed in 2014 Annual Evaluation
 - DoE Reference Station Design Task refined definitions
 - 2017 Annual Evaluation incorporates latest understanding of customer needs, technology status, and foreseeable development



Additional Information

**Hydrogen Station Network Future Approaches,
and Alternative Fuels Email listserv**

<http://energy.ca.gov/altfuels/2017-HYD-02/>



Wrap Up

Jean Baronas



Public Discussion

Phil Cazel



Contact Information

Please send questions and comments by December
22,2017 at 5 P.M to:

California Energy Commission
Docket Unit, MS-4

Re: Docket No. 17-HYD-02

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